Analysis of Faunal Remains at the Wall Site in Hillsboro, NC

By
Ava Noelle Wells

Senior Honors Thesis
Department of Archaeology
University of North Carolina at Chapel Hill

3/17/2016

Approved:

_____

Benjamin Arbuckle, Thesis Advisor

Dale Hutchinson, Reader

Margaret Scarry, Reader

List of Figures and Tables

Introduction

Archaeological faunal assemblages are important for a multitude of reasons, including aiding in the reconstruction of diets of various communities, as well as giving us information on the exploitation of animals at various archaeological sites. By better understanding the relationship between faunal assemblages and the archaeological site being studied, important questions about the site, and the area as a whole, can be answered.

North American archaeological sites can give us a variety of information on the relationship between animals and Native Americans, in both pre- and postcontact periods. Although research has been done extensively throughout North America, archaeological sites in North Carolina allow for the examination of animal exploitation in the region, as well as other information involving life before and after the arrival of Europeans. A site which exemplifies precontact life in the North Carolina region is the Wall site in eastern North Carolina. The faunal remains recovered from the site have been able to tell us about the diet and daily life of the people who lived there. Earlier faunal assemblages recovered from the Wall site have not been fully analyzed, and therefore leaves room for interpretation of precontact human and animal relationships.

The goal of this thesis is to analyze a faunal assemblage in order to improve knowledge of precontact Native American subsistence practices at the Wall site. Through the analysis of data from this assemblage, we can gain a better understanding of not only their diet, but also possible hunting techniques for precontact in the area. This analysis provides new information on the Wall site, and Native American archaeology in North Carolina as a whole, and helps us to better understand the archaeology of the surrounding area.

Introduction to the Wall Site

The Wall site is located on the Eno river, just outside of Hillsborough, North Carolina in Orange County. It is a precontact village in the piedmont region that shows Native American occupation (Trawick and Davis, 2001). The Wall site itself dates to the Hillsboro phase (AD 1400-1600). When first discovered in 1938, it was believed to be the site of an Occaneechi town visited by and written about by John Lawson in the early 1700s (Trawick and Davis, 2001). However, after the initial excavations, which took place in 1940 and 1941, there was very little evidence that this site was occupied in the postcontact period. Since then, additional excavations have been performed between 1984 and present day by archaeologists at the University of North Carolina at Chapel Hill. In the 1983-1984 excavation, it became apparent that the site was occupied too early for the site to be the Occaneechi town from postcontact period (Davis 2009).

The site is one of four archaeological sites in the nearby area that comprises the Hillsborough Archaeological District, the other three being the Hogue, Jenrette, and Fredricks Site, the earliest being the Hogue site, dating to AD 1000-1400, and the latest being the Fredericks site, dating to the postcontact period. The vicinity to these sites allows for comparison between different periods, as well as an idea that this area was occupied for a long time. The Fredericks site is also most likely the village visited by John Lawson in the early 18th century, as opposed to the Wall site (Davis 2009).

Although the Wall site was only occupied for a short period of time (Trawick and Davis 2001) , most likely around 20 years, the Wall site represents classic features of the Hillsboro phase that are not seen in earlier sites, including the presence of a compact village with circular houses and multiple palisades(Trawick and Davis, 2001). Current excavations have uncovered approximately one-third of the entire site, about 20,500 sq ft, and includes the uncovering of over

a dozen circular houses, averaging 25 feet in diameter, giving significant understanding of what a Hillsboro phase village looked like (Davis 2009). The Wall site is important for understanding native societies and their lives prior to the upheaval that came with the arrival of Europeans.

Materials and Methods

The faunal remains examined for this thesis are from the 1940 and 1941 excavations. The bones analyzed for this report came from two adjacent 10x10 squares, 110 r 80 and 110 r 90. Both of these were recorded during the initial excavation as "undisturbed soil" which, in this case, means midden (Davis 2016).

The analysis of the faunal assemblage took place between October 2015 and January 2016 at the University of North Carolina at Chapel Hill in the zooarchaeology laboratory. To identify the bones and species represented, comparative skeletons were used, as were books and atlases. These books included Elisabeth Schmid's *Atlas of Animal Bone*s (1972); Simon Hillson's *Mammal Bones and Teeth* (1992), as well as Hillson's *Teeth* (1986); and Adams and Crabtree's *Comparative Osteology* (2012). Identification followed Driver's (2011) discussion on recording faunal assemblages. The primary method for the identification was to first determine the skeletal element, before attempting to determine the taxon of the animal the skeleton belonged to. If the fragment was not identified to a more specific taxonomic category, it was classified as a small, medium, or large mammal.

Multiple quantification methods were utilized for this thesis. The methods used were NISP, bone weight, MNE, MAU, and %MAU. NISP, the number of identified specimen, is used to give the relative frequency of taxa, though it does not take fragmentation, age, sex, or size into account. It is the standard quantification unit used in zooarchaeology (Reitz and Wing 2007). It

is primarily useful in giving a broad idea of what number of bones were examined, giving a general idea of the abundance of taxa, and can be used to reconstruct diet and economy (Lyman 1994). Bone weight is utilized in to calculate the contribution of various taxa to the diet. It is useful because it addresses the differences in body size for different taxa in the assemblage (Reitz and Wing 2007). MNE, minimum number of elements, is the number of specimen determined from a given anatomical part, such as the proximal end of a femur, and is determined by how many elements are represented by the fragmented remains, taking overlapping features into account, and is used to measure fragmentation (Lyman 1994). MAU, minimum animal units, is a quantification unit that takes into account the number of skeletal parts present in a given skeleton for each element (two humeri, etc), but does not take into account age, sex, or size (Binford 1984). MAU is generated by dividing the MNE for each element by the number of times a given element appears in a given skeleton. It can be utilized to create %MAU, which is defined as the MAU divided by the maximum MAU observed in the assemblage. It provides an estimate of the element abundance for each of the skeletal elements present in the assemblage (Binford 1984).

Results

A total of 523 bones were analyzed for this report, all recovered from the 1940-1941 assemblage. The faunal assemblage was recovered by dry screening, most likely utilizing 1/2 – inch mesh (Davis 2016). It is possible that there was some removal of small or highly fragmented specimens from the assemblage by the excavation team after initial recovery from the site, as the majority of the bones are quite large and were easily identifiable. Small, broken specimens were largely missing from the assemblage studied. This is shown by the ratio of

identified to unidentified specimen, which was 465 to 58, meaning that 88.9% of the bones analyzed were identifiable. This is unusually high for a faunal assemblage. The majority of these 58 unidentified specimens were identified to a sub category of mammal or bird. Only a total of six specimens were unable to be identified.

Three taxonomic classes were identified in the assemblage including reptiles, birds, and mammals. In regards to reptiles, the only bones found were from unidentified species of turtle specimens. The only identified bird taxa found in this assemblage was turkey, though there were also some unidentified specimens as well in this regard. There were two mammal taxa identified in the assemblage, white-tailed deer (*Odocoileus virginianus*), and raccoon (*Procyon lotor*). Mammals were also identified by size when the proper taxa could not be determined. There were both medium and small unidentified mammals recovered in the assemblage. Unidentified specimens, medium mammals, and small mammal specimens were primarily fragments, and make up approximately 3% of the weight, and 11% of the NISP. In this grouping, medium mammal is considered to be anything of approximately deer size, and small mammal would include rodents and animals such as the raccoon.

Specimen	Weight (grams)	Count
Mammal	11.1	17
Medium mammal	180.5	30
Deer	5714.85	373
Raccoon	8.7	3
Small mammal	9.35	5
Turkey	51.1	13
Turtle	322.2	76
Unknown	2.4	6
Grand Total	**6300.2**	**523**

Table 1 – NISP and weight of entire assemblage

The small mammal bones, which could not be positively identified to a specific taxon , included three mandibles and a calcaneus. The calcaneus was very small, its greatest length measuring only 21.4 mm. Although identified as a calcaneus, there was no positive comparative skeleton to make a more specific identification.

In regards to the specimens identified as medium mammal (30 specimen were identified as such), it is most likely that these specimens represent white-tailed deer. However, there was uncertainty as to whether or not these specimens exhibited specific morphological traits that would positively identify these specimens as *Odocoileus virginianus*, or they were too eroded or fragmented to make a positive identification. Of the thirty bones identified as medium mammal, fourteen of these were cranial fragments. Other elements classified as medium mammal included the maxillary bone without identifiable morphology or teeth. The majority of the rest of this category comprised of fragments.

Reptile: Turtle

Seventy-six bones were identified as turtle, and comprised 5.1% of the total weight of the assemblage in grams. All turtle specimens found in the assemblage were either carapace , the upper shell, or plastron, the lower shell, fragments. There were no limb bones found in the entire assemblage. This most likely suggests that the turtle shells were utilized around the site as tools, either as bowls for eating or as other useful implements. In later excavations at the Wall site, specifically those which took place in the 1980s, several different species of turtle were identified (Dickens et al. 1987). Turtles found at the site included the box turtle (*Terrapene carolina)*, snapping turtle (*Chelydra serpentina*), and painted turtle *(Chrusemys picta*) (Dickens et al. 1987). It is most likely that the plastrons and carapaces found in this collection belonged to

one or multiple of these species. However, the turtle remains were not identified to species for this analysis.

Bird: Turkey

Thirteen bones were identified as bird, eleven of which were positively identified as turkey (*Meleagris gallopavo*). Turkey bones represented 2.5% of the fauna based on NISP and totaled in 0.8% of the total bone weight, making turkey the second most common species in the assemblage. Two humeri were identified, as was a metatarsal and a scapula, and two tibias. The presence of bones from various portions of the skeleton, including the wing, back, and leg, suggests that entire birds, and not just wings or parts of the body, were found at the site. Given the fact that they did comprise approximately 2.5% of the assemblage, it is most likely that turkey did comprise a part of the diet, though not necessarily a large portion. Publications referencing the Wall site make references to wild turkey, discussing their presence in faunal assemblages and their diet (Davis 2009; Dickens et al. 1987). This, as well as the fact that there is no evidence of turkey domestication in the area at the time, suggests that the turkey found at the site were wild.

Mammals:

Raccoon *(Procyon lotor)*

Three bones were positively identified as raccoon, representing 0.6% of the assemblage based on NISP. These include two mandibles, one of which still had the majority of its teeth. The weight of the raccoon bones was only 0.1% of the total weight. The MNI calculated for this species was two, as there were two right mandibles recovered in the assemblage. A separate

canine was also found, which could potentially have been paired with one of the mandibles recovered, as they were all found in the vicinity of one another. Considering these bones were found in midden deposits along with other animal bones, it is very likely that raccoons were killed and their bodies utilized in some fashion, rather than the raccoons foraging in the trash or happening to die in or around the site. There are a multitude of possibilities for how the raccoons were utilized, including as part of a pelt, or they could have been eaten alongside other animals found in the assemblage. However, if the raccoons had been a regular part of the diet, most likely more than just the mandibles would have been found in the assemblage. This suggests that the raccoons were hunted for ulterior reasons.

White-tailed deer *(Odocoileus virginianus)*

Of the bones analyzed for this thesis, 373 were identified as *Odocoileus virginianus*, meaning that white tailed deer comprised 71% of the NISP. In terms of weight, deer bones totaled 90.7% of the total weight in grams, indicating the predominance of deer in this assemblage, and presumably in the diet of the Wall site occupants. Although the high number of white-tailed deer in the assemblage could be attributed to hand selection after the initial collection, there is also precedence for a large number of white-tailed deer to be found in the sample. Later excavations at the site also had high percentages of white-tailed deer in the assemblage, the bone weight for later faunal collections being 61.4% deer (Dickens et al. 1987). With this in mind, although the weight is significantly higher in this smaller assemblage, it is likely that a predominance of deer is commonplace in precontact North Carolina.

Skeletal elements abundance (for deer)

Skeletal abundance is important to note in faunal analysis, as it can give important information pertinent to taphonomy, skeletal transport, and potential biases that might have occurred during the process that would impact the faunal remains collected and analyzed (Reitz and Wing 2007). The skeletal representation of the deer found at the Wall site indicates a presence of the majority of the skeleton for the white-tailed deer, including long bones, as well as mandibles and foot bones. However, there are certain elements that are underrepresented that suggests density-mediated destruction was present as well.

To analyze the skeletal abundance, MAU was used, as it is a good measure of element abundance. MAU addresses the problem of different numbers of skeletal elements between species, and also allows for the presence of multiples of the same element being in the skeleton. MAU values are shown in Table 2. As evident by the table, shown below, the most common element found was the mandible, with a 1.000 %MAU specimen recovered in the assemblage. Other common skeletal portions were distal humerus with a.781 %MAU, the astragalus (.719), and proximal ulna (.656). Some of the other best represented body parts (ones which had greater that 50% %MAU, include the proximal radius (.531 %MAU), calcaneus (.625), as well as the scapula (.75). It would appear that the front long bones, as well as some of the tarsals, are most prominent in the assemblage.

Element	NISP	MNE	MAU	%MAU
Mandible	32	32	16	1
Scapula	24	24	12	0.75
Humerus, distal	25	25	12.5	0.781
Humerus, shaft	1	1	0.5	0.031
Ulna, proximal	21	21	10.5	0.656
Radius, proximal	17	17	8.5	0.531
Radius, distal	5	5	2.5	0.156
Metacarpus, proximal	5	5	2.5	0.156
Cervical vertebra	16	16	2.286	0.143

Lumbar vertebra	19	19	3.8	0.238
Innominate	17	17	8.5	0.531
Femur, proximal	4	4	2	0.125
Femur, shaft	1	1	0.5	0.031
Femur, distal	11	11	5.5	0.344
Tibia, proximal	9	9	4.5	0.281
Tibia, distal	2	2	1	0.063
Metatarsus, proximal	1	1	0.5	0.031
Astragalus	23	23	11.5	0.719
Calcaneus	20	20	10	0.625
1st phalanx	17	17	2.125	0.133
2nd phalanx	17	17	2.125	0.133
3rd phalanx	6	6	0.75	0.047

Table 2 lists the number of deer skeletal parts, as well as their MNE, MAU, and %MAU. These data was used to generate both a graph for volume density and for a food utility index, as shown below.

Some of the body parts with poor representation (less than 50% %MAU) are the ribs, vertebrae (.143 %MAU for cervical vertebrae, and .238 for lumbar), the femur, both proximal (.125) and distal (.344), as well as the tibia (proximal: .281, distal: .063) and distal radius (.156). The metacarpals (.156) and metatarsals (.031), as well as the phalanges (first phalanx: .133, second phalanx: .133, and third phalanx: .047) are also poorly represented in this assemblage.

Of those skeletal elements that are best represented, the elbow joints and the bones found in the hind feet are some of the most abundant, as well as the mandible, which is often the most common due to its high density. However, the feet (metapodials and phalanges) are under-represented in the assemblage. As the %MAU indicates, although there are some bones that are less well-represented in the assemblage, there are no skeletal portions that are noticeably absent from the assemblage.

In order to see whether or not the presence or absence of bones was connected to their density, a volume density (VD) graph was constructed for the skeletal abundance data at the site,

based on the %MAU, and the data for VD for each skeletal part for deer given by Metcalfe and Jones (1988). This was placed in a scatterplot (See Figure 1). This is implemented in order to determine whether or not the bone density of certain skeletal portions and the %MAU have a positive correlation, which would suggest that density-mediated destruction is a large factor in the absence of certain skeletal portions (Reitz and Wing 2007).

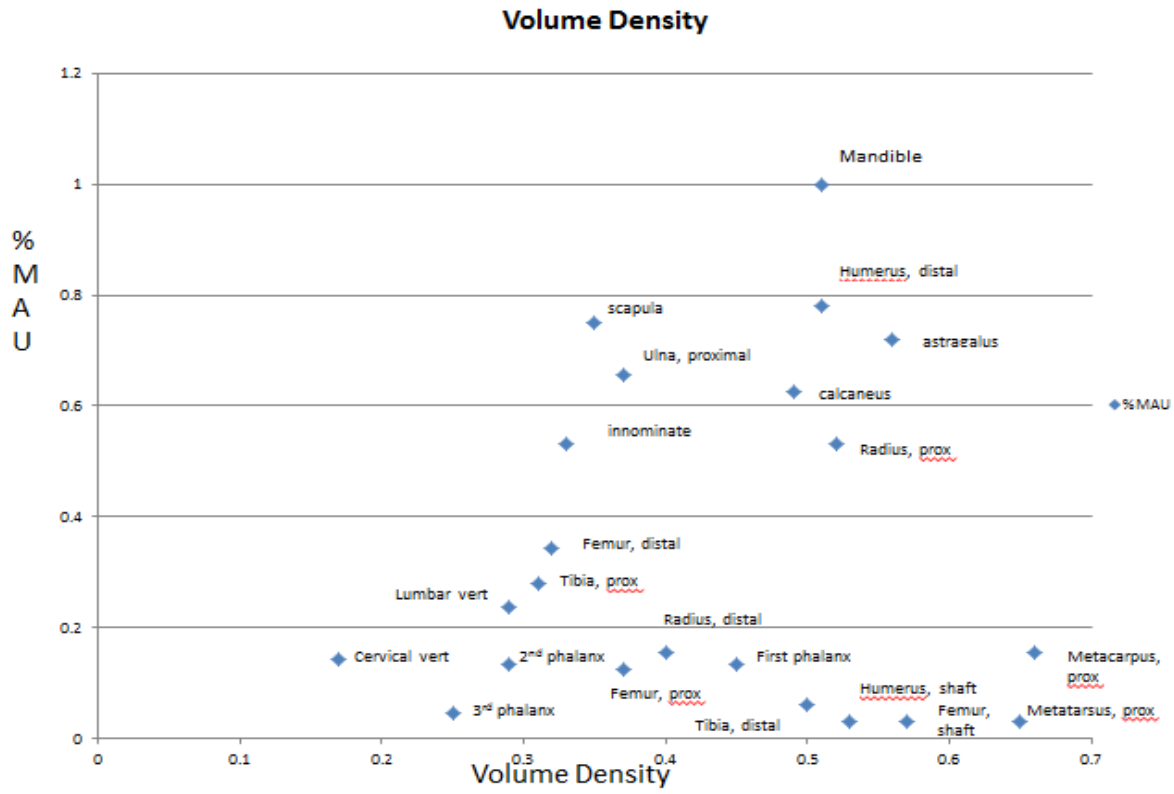

Figure 1 – Volume Density of white-tailed deer skeletal parts

The relationship between skeletal part density and the MAU measure of abundance shows the impact of density mediated destruction on the assemblage. In the assemblage, the underrepresentation of certain bones was most likely a result of taphonomic processes. Some elements show a positive relationship between density and abundance, meaning that the denser

the bone, the greater the %MAU, which is to be expected, as studies show density has a major impact on the survival of certain elements. Such elements, such as the mandible, distal humerus, astragalus, proximal ulna, and scapula, are expected to be present in the assemblage in large numbers based on high bone density. However, other highly dense elements are poorly represented, and show a negative slope. These elements include the proximal and distal metatarsus, as well as the shafts of the humerus and femur, as well as the proximal ends of the metacarpus and metacarpus, the phalanges, and the distal tibia. This indicates that some factor other than bone density is responsible for their low frequencies in the assemblage.

There are several factors that could explain the discrepancy shown above. In the assemblage, there is some indication of different impacts of taphonomy, such as the presence of bone gnawing, both from rodents and from larger carnivores. Several bones displayed teeth marks from carnivore gnawing – most likely from dogs, suggesting that this might have played a factor in the remains found and analyzed (Munson 2000). These elements with carnivore gnawing were mostly long bones, specifically the femur and proximal ulna comprised of the majority of the gnawed bones. Apart from this, certain bones also displayed cut marks, although there were fewer of these than there were bones with bite marks. Two tibiae and a humerus had clear cuts marks, as well as a scapula and an atlas. Regardless, the skeleton was definitely heavily impacted after death, which could give an explanation as to some of the denser bones being less present in the faunal assemblage.

A food utility graph was also constructed. The food utility index (FUI) indicates the usefulness of various skeletal portions by meassuring the amount of weight of meat, marrow, and bone grease of each body part, and establishing the utility of the body part in terms of how much food it can supply. Elements are typically separated into those with low FUI (<1000), those with

a medium FUI (1,000 -3,000), and those with a high FUI (>3000). In the case of this assemblage, the food utility graph utilizes %MAU and compares it to Metcalfe and Jones' (1988) FUI data, derived from a white-tailed deer meat utility index. It displays a slightly negative relationship between %MAU and food utility. This slightly megative relationship, according to Metcalfe and Jones' analysis of Binford's MGUI means that there was bulk transport of the carcass. Bulk transport would imply that the hunters brought most, if not the entire, carcass from the kill site back to the camp, instead of butchering the deer at the kill site. Despite the lower presence of certain elements, this idea of bulk transport corroborates the presence of the majority of the skeleton being found at the Wall site, as indicated by the %MAU.

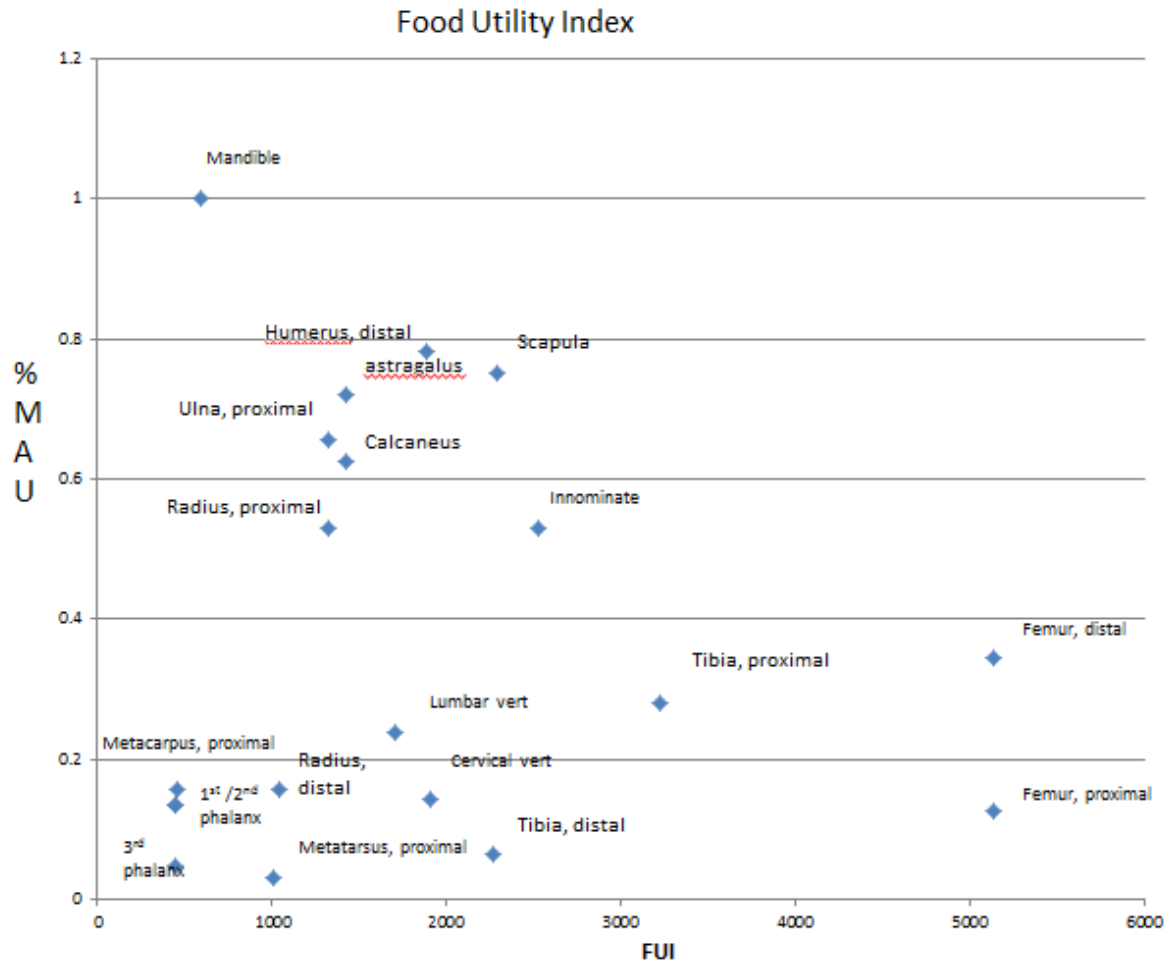

Figure 2 – Food Utility Index of white-tailed deer found at the Wall site

Biometrics

White-tailed deer is a sexually dimorphic species, which means that we are able to distinguish between males and females through skeletal differences, such as the robusticity of certain bones (Leberg and Smith 1993). Their weight and height are indicative of this nature, meaning that the measurements of their bones can indicate the presence of male and female white-tailed deer in the assemblage. This can tell us whether or not these animals were targeted based on sex, or whether or not their hunting practices were nondiscriminatory, giving important insight into the hunting practices at the Wall site.

In estimating the sex of the skeletons, measurements were taken of several of the bones, including the astragalus, calcaneus, the phalanges, and several of the long bones following von den Driesch (1976). Although other measurements were taken from the assemblage, the three with the greatest number of measurements, were the astragalus, distal humerus, and proximal radius breadth, and were therefore chosen to discuss the sex of the specimen present in the assemblage. The results generated from creating histograms of the data shows mixed results in terms of whether there was any sort of discrimination between hunting males and females.

From looking at the measurements from the astragalus, it seems that there are two groupings, which seem to rather evenly differentiate between males and females. Figure 3 shows the distal breadth of the astragalus. Purdue (1989) article discusses the sizes of both male and female white-tailed deer in central Illinois, the distal breadth of the male astragalus ranges between 23.5 and 26 mm, and the female deer astragalus ranged between 21.75 and 24 mm. In Figure 3, there are two distinct peaks, the first one slightly smaller than the second. The two peaks are located at 23-23.5 mm, and 25-25.5 mm. The first peak included four measurements,

while the second had 5 separate measurements. According to the data from Purdue (1989), the first peak displayed in Figure 3 represents female astragali, and the second peak signifies male astragli. With this in mind, the histogram (Figure 3) gives a clear indication of both male and female deer, in relatively equivalent numbers, with there being male prevalence here.

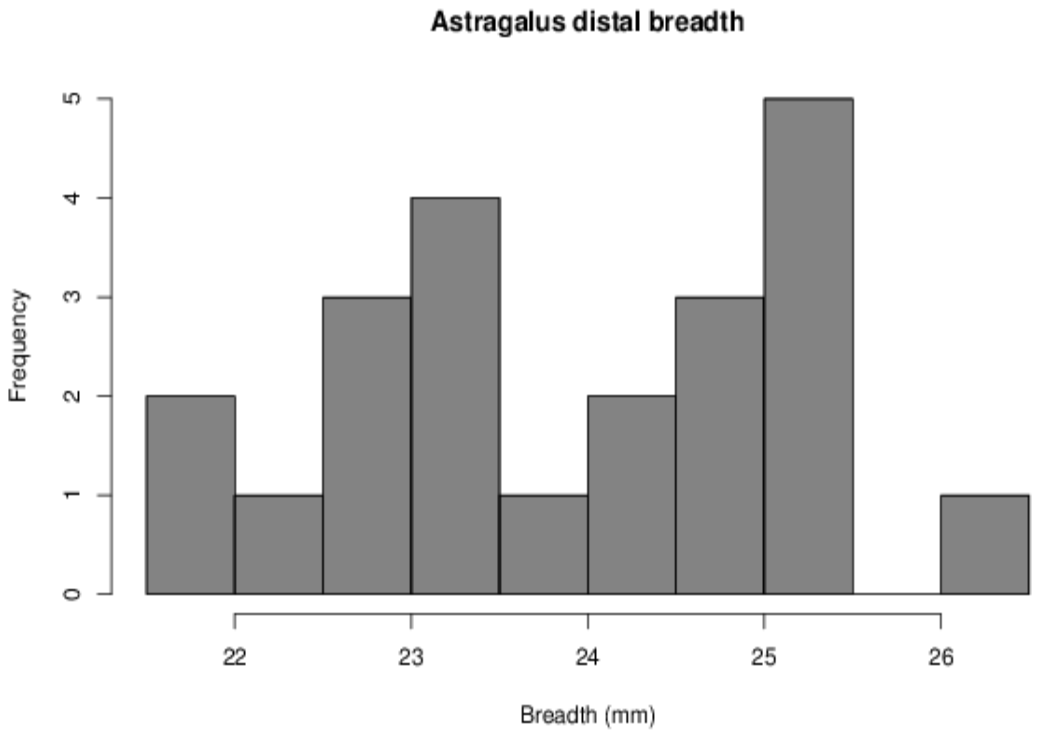

Figure 3 – Distal breadth of the astragalus (mm) for white-tailed deer found at the Wall site

The histograms for proximal radial breadth and distal humeral breadth, however, show different patterns. For example, a histogram for the radius proximal breadth was also constructed (Figure 4). In the histogram, there are two clusters easily visible, one from 33mm to 35.5 mm, which contained ten measurements total, and another cluster from 36.5 mm to 38 mm with a total of four measurements. This would most likely suggest that there were more female deer found than fully grown males, if it is to be assumed that the more robust male represents the smaller,

second cluster, and the females represent the larger primary cluster for the radius proximal breadth.

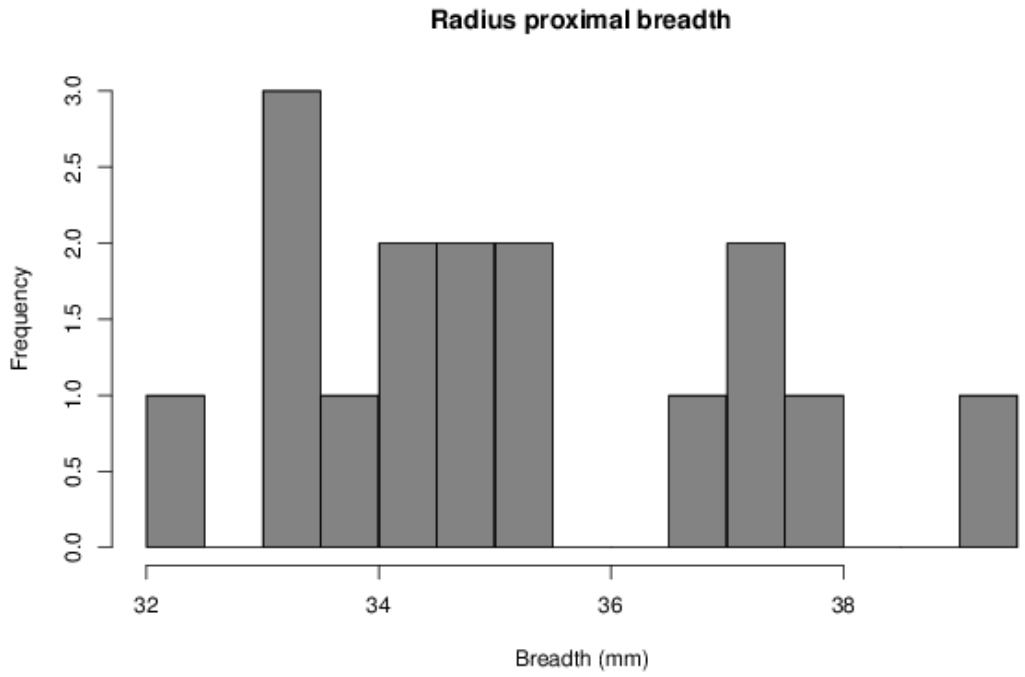

Figure 4 – Radius proximal breadth (mm) of white-tailed deer at the Wall site

The humerus distal breadth (Figure 5) shows similar results to the proximal radius breadth (Figure 4), with a large peak at 35.5 mm containing 5 measurements that falls before reaching a smaller, second peak appears at 39.5 mm with three measurements recorded. This appears to show data similar to the proximal radial breadth, where more female deer are present in the assemblage than males.

So it appears that there are some discrepancies in terms of the number of males to females in the assemblage between the long bones and the bones such as the astragalus. Considering that two of the three graphs demonstrate similar patterns, it is most likely that the majority of the assemblage comprised primarily of female deer. Random variation of small

samples could possibly account for the abnormality seen in the astragalus histogram.

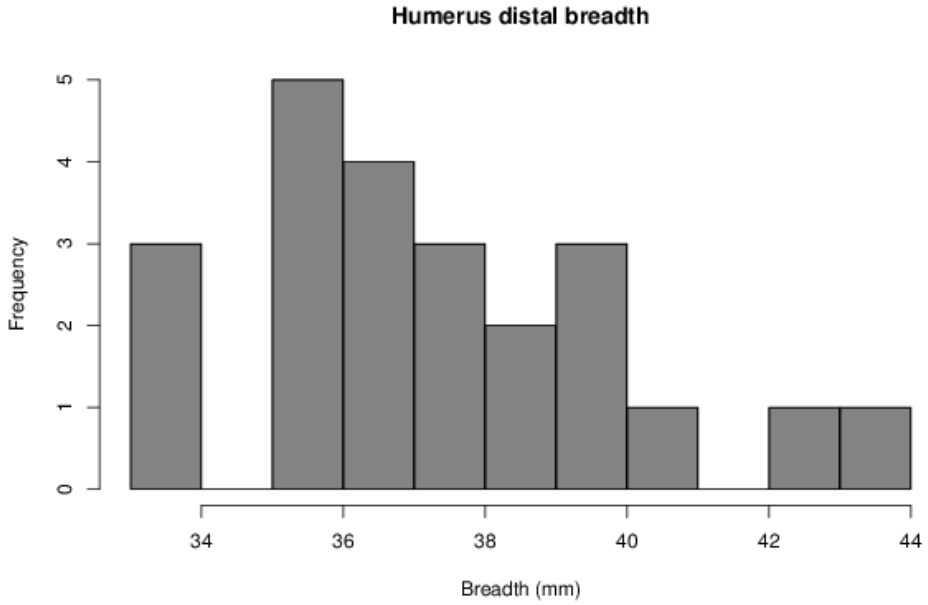

Figure 5 – Humerus distal breadth (mm) of white-tailed deer at the Wall Site

Age data

Both epiphyseal fusion and dental wear can be used to determine the age of the deer present in the assemblage (Reitz and Wing 2007). Severinghaus (1949) was used to interpret tooth eruption. In terms of dental wear the teeth were placed into categories of wear, from "none" to "very heavy." 103 teeth were examined in this fashion (Tables 3-5).

M1 Tooth Wear			
Tooth Wear	Mandibular	Maxillary	Grand Total
light	3	1	4
light/medium	1		1
medium	5	2	7
medium/heavy		2	2
heavy	3	1	4
Grand Total	**12**	**6**	**18**

Table 3 – M1 tooth wear for white-tailed deer at the Wall site

The first molar of white-tailed deer begins erupting between seven and ten weeks of age, and completes its eruption between six and seven months (Severinghaus 1949). As shown in Table 3, the majority of the first molars displayed "medium wear," but another significant portion of the dentition were also classified as "medium/heavy" or higher, suggesting that the majority of the teeth were from older individuals. According to Severinghaus (1949), light wear begins to show on the first molar between nine and eleven months, and becomes moderate between thirteen and seventeen months. This gives an indication that some of the specimens (at least four) may have been between nine and seventeen months at death, given the amount of wear found. The absence of an abundance of very heavily worn teeth also gives an indication that, although older individuals were targeted, very aged individuals were not. White-tailed deer can live to over ten years of age (Severinghaus 1949) but there was no indication that any of the specimen lived this long. Given the wear on the M1, at least seven, and up to thirteen, were likely in their prime around four years of age at death.

M2 Tooth wear			
Tooth Wear	Mandibular	Maxillary	Grand Total
none/light	1		1
light	1		1
medium	4	1	5
medium/heavy	1	2	3
heavy	1		1
Grand Total	**8**	**3**	**11**

Table 4 – M2 tooth wear of white-tailed deer at the Wall site

The second molar erupts around seven months of age (Severinghaus 1949). There was only one tooth in the entire assemblage which displayed no wear. This tooth was a mandibular

second molar that was in the process of erupting. This suggests the presence of some juvenile deer at the site. Five of the second molars displayed medium wear, placing them mostly between two and four years of age, which is similar to the results found for the majority of the M1 molars. Four of the M2 displayed heavier wear, suggesting an age of around 4 years at death.

The third molar begins erupting at around age thirteen to seventeen months, and is completely erupted by twenty to twenty-four months. Another tooth that was not fully erupted was a mandibular third molar with light wear, so although it was still in the process of erupting, it had still clearly been utilized. Severinghaus would place this at an age of approximately 17 to 20 months. As seen below in Table 4, nearly 30% of the M3 teeth represented show medium wear, and 66% of the teeth show medium wear or less, suggesting that the majority of individuals which were targeted were adult, but not necessarily severely aged. There were ten M3 teeth that had medium/heavy or heavy wear. Heavy wear on the third molar suggests an age of approximately six years. So there is evidence of more elderly deer in the assemblage, although they are not necessarily elderly.

M3 Tooth Wear			
Tooth Wear	Mandibular	Maxillary	Grand Total
light	5	3	8
light/medium	2		2
medium	8	3	11
medium/heavy	2	2	4
heavy	5	1	6
Grand Total	**22**	**9**	**31**

Table 5 – M3 tooth wear in white-tailed deer found at the Wall site

Deciduous teeth were also identified in the collection. The deciduous premolars are replaced by the adult dentition during the period of seventeen to twenty months. In this regard,

looking at mandibular dentition, 14 out of 75 teeth could be positively identified as deciduous teeth, so approximately 19% of the mandibular teeth recorded were from juveniles. The rest were permanent teeth. Because of the presence of dp4 in the assemblage, there is an indication that at least some of the deer found at the site were younger than twenty months, in order for them to still have their deciduous premolars present.

Another way to analyze these data is to look at the proportion of dp4 teeth to P4 in the assemblage. A simple ratio of permanent to deciduous fourth premolars was constructed (see Table 6).

Number of dp4 teeth	Number of P4 teeth
4	10

Table 6 – Number of dp4 teeth compared to the number of P4 teeth found in the assemblage

Comparing the number of dp4 and P4 teeth, the number of dp4 dentition present in the sample accounts for 28% of the collection (4 out of 14). This, along with the presence of other deciduous teeth, would suggest that at least one-fourth of the assemblage was young enough to still have their fourth premolar at their time of death, which would be earlier than seventeen months, when the dp4 begins to be replaced. Another format to look at the relationship between dp4 and P4 involves the tooth wear found on each, as shown in Table 7.

P4 and dp4 tooth wear					
	dp 4		P4		Total
Tooth wear	Mandibular	Maxillary	Mandibular	Maxillary	
Medium	2	1	3	3	9
med/heavy	1				1
Heavy			2	2	4
Grand Total	**3**	**1**	**5**	**5**	**14**

Table 7 –P4 and dp4 tooth wear of white-tailed deer found at the Wall site

As indicated, there is no heavy wear on the deciduous teeth, though some of the permanent do show some indication of heavy wear. All of the teeth discussed above showed at least some severe wear, however. This shows that there are no newborn fawns in the assemblage.

In addition to dentition, age was also analyzed through looking at the epiphyseal closure of long bones. The fusion times for Graph 6 were taken from Purdue's 1983 article on epiphyseal fusion times for white-tailed deer. In the graph, the bones are arranged in ascending order of epiphyseal closures, with proximal radius being the earliest (fusing at two months in females, and five months for males), and proximal humerus being the latest (fusing at 29 months for females, and 30 months for males). From looking at the chart, it seems as though juveniles are relatively rare in the assemblage.

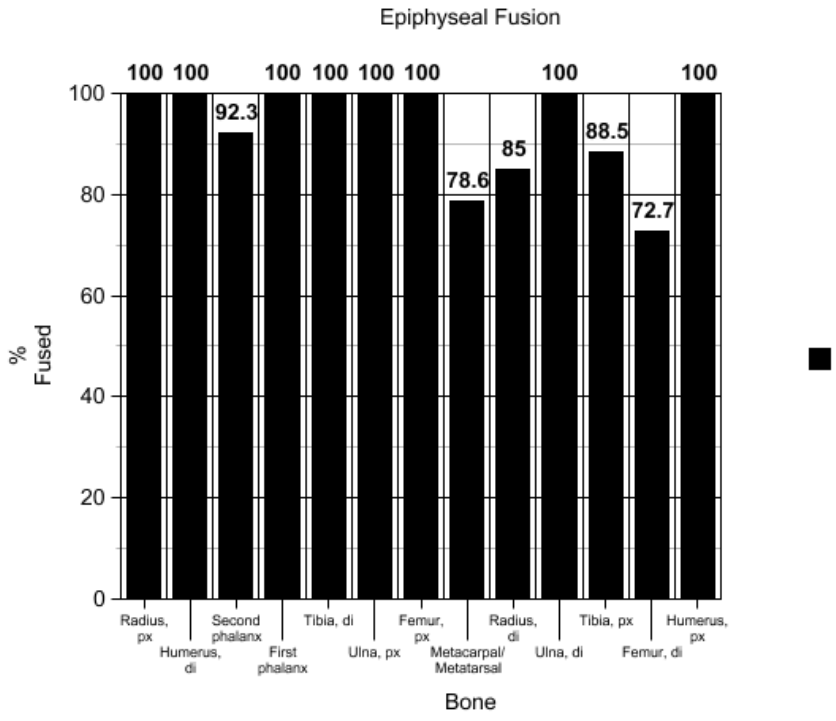

Figure 6 – Epiphyseal fusion percentages of long bones in white-tailed deer found at the Wall site, arranged in order from earliest to latest fusing bone epiphyses

Although most of the specimens were fused, the unfused specimens allow us to identify the ages at which deer were killed. The second phalanx begins fusion at approximately five months for females, eight months for males (Purdue 1989). This means that 7.7% of the second phalanges found belonged to specimens killed prior to eight months. The metacarpals and metatarsals begins fusion at twenty and twenty-three months for female and male deer respectively, which would mean that 22% of the deer killed would be younger than this age at the time of their death. The distal radius fuses at a similar time in this regard, which means that most likely 15% of the deer were younger than two years old. The proximal tibia and distal femur fuses at 23 months for females, and 29 months for males, again suggesting that 28% of the deer killed were younger than two and a half years at the time of their death. This corroborates the tooth wear data discussed earlier, specifically the presence of the dp4 teeth, which also suggested that approximately one-fourth of the assemblage was younger than two years of age. This gives us an indication that that both sources of age data are indicating that some juveniles were present in the assemblage, but the majority of those killed were above two years old at the age of death.

Fusion of bones			
Bone	F	UF	Grand Total
Radius, px	2		2
Humerus, di	24		24
Second phalanx	13	1	14
First phalanx	17		17
Tibia, di	2		2
Ulna, px	8		8
Femur, px	2		2
Metacarpal/Metatarsals	22	6	28
Radius, di	17	3	20
Femur, di	8	3	11

Tibia, px	9		9
Ulna, di	7		7
Humerus, px	1		1
Cervical vertebra	19	3	22
Thoracic vertebra	2	2	4
Lumbar vertebra	12	7	19
Innominate (Acetabulum)	16		16
Sacrum	2		2
Grand Total	**183**	**25**	**208**

Table 8 –Number of fused and unfused bones in white-tailed deer found at the Wall site. Organized according to Purdue (1989).

Table 8 shows the number of unfused proximal and distal epiphyses for all identified deer skeletal elements. In terms of greatest percentages, the greatest emphasis on unfused epiphyseal ends stems from vertebrae, which tend to fuse later in the deer's life. Very few bones that fuse early or during the deer's juvenile stage were found to be unfused.

Discussion

The faunal data studied for this thesis gives us a picture of animal exploitation at the Wall site during the precontact period, thereby allowing us to address the issues of deer hunting at the site, as well as the diet of the community in regards to animals. Using the data collected by analyzing the remains, we have gained an idea of taphonomic processes, and the sex and age structure of the deer killed in the area.

In terms of the overall collection, it seems that the high percentage of white-tailed deer would suggest that they were a highly significant portion of the diet for the Wall site, given that it comprises of over 90% of the bone weight, and over 71% of the NISP. The presence of multiple turkey bones, which comprised 2.5% of the overall NISP, would suggest that these birds

were also most likely eaten and formed part of the community's diet as well. The presence of small mammals does not offer enough evidence for whether or not they were hunted for food or if their presence suggests ulterior utilizations, such as for clothing or decoration. In terms of the high incidence of turtle carapaces, there is the possibility that these bones were utilized as bowls or something similar. The lack of other turtle bones could also help suggest this.

As stated above, deer was a large portion of the diet at the Wall site, and some knowledge of the hunting practices at the Wall site can be gained from the data recovered from the assemblage studied. Given the high portion of deer in the assemblage, understanding the hunting practices would allow us to gain a better understanding of the community as a whole.

In regards to the food utility graph and the graph on volume density, the food utility seems to suggest that the entirety of the carcass was transported to the site, as opposed to being chopped up and only pieces being transported to the site. This is indicated by the MAU data showing that all parts of the carcass are present. The %MAU tells two separate stories in regards to bone representation. First, it shows there is under-representation of certain skeletal elements, such as some of the long bones, including the distal tibia (.063 %MAU), the proximal tibia (.281), and the entirety of the femur (proximal: .125 %MAU, distal: .344, shaft: .031), one would expect to find. The volume density shows that this underrepresentation is unrelated to the density of those parts. The underrepresentation could be due to a multitude of reasons, but the most likely explanation is that they were not present in the midden, meaning they might have been utilized for another purpose, such as for tools or something similar. Another potential interpretation is that some of the underrepresented bones were not transported to the site with the rest of the carcass. Given that this would also explain the absence of metapodials and phalanges in the assemblage as well, this seems the most likely answer as to the cause of their absence.

Density mediated destruction most likely played a part in the absence of some of these bones, specifically those with a lower bone density, such as the cervical and lumbar vertebra, and the phalanges, as indicated by the presence of gnawing on some of the bones. However, this most likely only played a role in bones such as the proximal ulna, which followed the volume density curve, and consequently frequently showed signs or carnivore gnawing. The presence of bite marks suggests that most likely some of the specimen were destroyed, which would aid in explaining the lack of certain bones. It seems that the skeletal abundance can be explained by a combination of density mediated destruction, and an underrepresentation of limbs as a result of human activity.

The data from the site also allowed us to reconstruction potential deer hunting practices at the Wall site. The data from the breadth of the astragalus would suggest that the hunters did not have a strong preference between male and female deer when they hunted. The data from both the radius and the humerus, however, would suggest that there might be some tendency towards hunting females.

The age data suggests that the animals targeted were primarily adult individuals, over the age of two or two and a half years, though juveniles were present, and totaled approximately 25% of the assemblage. By looking at the graph for epiphyseal fusion percentiles, arranged by the date at which the bone normally fuses, it is clear that the community at the Wall site were not targeting white-tail deer that were still in the early stages of bone development. Instead, hunters appear to have been targeting deer that were over two years of age. Although as the dentition shows, some younger white tailed deer were clearly brought to the site.

According to Heather Lapham (Blanton and King 2004), deer killed prior to the colonial deerskin economyoften targeted juveniles. This is seen at sites such as Crab Orchard and Hoge,

both of which are located in Virginia and date to the fifteenth and sixteenth centuries. The two precontact sites, according to the data, targeted predominantly juveniles under the age of one year (nearly 15% of the deer at each of these sites were under the age of one), with an equal number of male and female deer present in the assemblage. The Trigg site, also located in Virginia, dating to the postcontact period, shows a change in trends with the increase in hide trading. At this site, hunters targeted older individuals of at least three and a half years of age who were predominantly male, as male hides fetched the best price (Blanton and King 2004). The data at the Wall goes against Lapham's discussion on killing practices for precontact, as juveniles under the age of one were not targeted in this assemblage, and in this regard, follows more closely the model for postcontact deer hunting, when skins were used in trade. Of course, in terms of trading skins, the deer that were most often targeted were male, and the evidence from the assemblage at Wall shows very little, if any, trend in this direction. Given the fact that intensive deer skin trading did not take place until after the 1700s, this makes sense.

With this information in mind, it is apparent that the Wall site represents different hunting patterns than those described by Lapham. Using Lapham's information, the Wall site follows the age discrimination found at Trigg, but utilizes the lack of discrimination between sex found at Hoge and Crab Tree.

Most white-tailed deer are born between April and July, with June being the predominant month for birth (Beier and McCullough 1990). Using the tooth eruption data, we can determine the time at which some of the deer were most likely killed, and gain some knowledge on the seasonality of deer hunting. One white-tailed deer had a second molar in the process of erupting. Since the second molar erupts at approximately seven months of age, the deer in question was killed sometime around January. The individual with the erupting third molar was most likely

killed some time in the spring. Some of the M1s had light wear, which begins to appear between nine and eleven months, suggesting again that these individuals (five in total) were most likely killed in mid-Spring. There is not much other evidence of seasonality, with the exception of a fragment of a frontal bone with the pedicle of an antler. From the pediment, it was clear that the antler had recently been shed, suggesting that the specimen in question was killed during the time when the antler would have been absent. The time when most white-tailed deer shed their antlers is mid-December to January (Beier and McCullough 1990). This coincides with the time the juvenile with the erupting molar was killed. With this in mind, it seems that the site hunted deer during the winter months, which would suggest a pattern of winter and spring hunting.

The Wall site is very similar to other sites in the region in regards to the faunal assemblage, such as the Fredericks site, located near Hillsboro, NC, on the Eno river near the Wall site, which was also analyzed by Holm (Dickens et al. 1987). The Fredericks site dates to around AD 1700, a later period than the Wall site, though has a similar faunal assemblage to the Wall site. At Fredericks, there was also a heavy abundance of deer in the assemblage. At the site, 4731 white-tailed deer bone fragments were recovered, and comprised 44.3% of the total bone weight found at the site. Given their close proximity to one another, this is not surprising. However, it does give credibility to the abundance of deer found in the faunal assemblage. Fredericks also had a turkey present, comprising of 2.32% of the bone weight, as well as evidence of multiple species of turtles. This gives the idea that deer were plentiful in the Piedmont area during the time period c. 1400-1700, and were exploited by those living in the area.

Other sites also compared favorably to the Wall site in regards to similarity in the faunal assemblage recovered. Vanderwarker and Stanyard (2009), in their analysis of the Sandy Site at

Roanoke, Virginia, had very similar results in regards to the faunal remains found at the site, which was primarily mammals, specifically white-tailed deer. In their assemblage, the bone weight for 1238 *Odocoileus virginianus* bone fragments comprised of 69.5% of the total weight of the assemblage. At the site, turtle and raccoon were also found. This comparative data suggests that deer was a significant portion of the Native American diet before and around the contact period throughout the southeastern United States.

One thing to mention is the lack of other aquatic animals found at the site. Considering its proximity to a river, it would have been unsurprising to find skeletal elements from such creatures. This raises the question as to whether or not this absence is a cultural practice or taphonomy and recovery problems. In looking at later excavations from the Wall Site, specifically the 1983-1984 excavation period, the faunal analysis from Mary Ann Holm produced a number of different aquatic species, including catfish, suckers, gar, and sunfish, as well as frogs and toads, and her analysis stemmed from nearby the midden soil analyzed for this report.

One of the things which might account for this is the difference in recovery methods. As stated earlier, the 1940-1941 excavation utilized dry screening as its main recovery method. In the 1980s at the site, flotation was used, which would collect a far more representative sample in terms of the smaller aquatic animal remains that might be missed in dry screening. With this in mind, it is important to understand that other, smaller bones of other mammals, and not just aquatic life, might be missing from the overall assemblage.

Two items that might account for missing specimens would be carnivore gnawing or recovery bias. As stated earlier, these is evidence for carnivore presence and interference in the faunal assemblage studied, as seen by the presence of gnawing on multiple bones found in the

assemblage. The presence of such gnawing would suggest that there could be an absence of certain bones that one might otherwise expect to see, such as the metacarpals and some of the long bones, such as the femur.

Another possibility is that there was some recovery bias. As stated earlier, later excavations had far more efficient means of faunal recovery that were not utilized in the earliest excavations. However, there may have been some hand sorting as well after the initial excavation, as evident by the lack of small, fragmented bones in the assemblage studied for this report. It is important to keep both of these in mind as potential factors for bias, as it would impact the results of the NISP, and limit the type of bones recovered, as well as the number of taxa available for analysis in this report. However, there is no way to confirm or deny the possibility of recovery bias at this time, as there is no evidence proving that such practices ever took place at the site.

Conclusion

The faunal assemblage at the Wall site was comprised mostly of white-tailed deer, though there may have been some unintentional recovery bias, as later excavations displayed a wider array of animals at the location that was present in the faunal assemblage covered. The diet at the site, however, seemed to comprise mostly of deer and turkey, and this was similar to other sites found in Virginia and North Carolina.

The assemblage suggested taphonomic processes played a factor, as certain highly dense bones, such as the metapodials and the shafts of the humerus and femur, were underrepresented in the assemblage. Other dense bones were present, however, suggesting some density-mediated destruction practices as well. Although there were juveniles present in the assemblage, it was a

small portion, and the majority of the deer collected seemed to be in their prime, suggesting that the hunting practices at the Wall were targeting fully mature deer. There also seemed to be little discrimination between males and females while hunting, though perhaps slightly more females were targeted. In terms of seasonality, this assemblage suggests that the majority of the hunting took place during the winter and spring months at the Wall site.

Understanding the diet and hunting practices of precontact Native Americans allows us to not only get a better idea of what life was like prior to Europeans in the Americas, but also allows us to see important differences between the two time periods. By analyzing the fauna at the Wall site, we now have a better understanding of deer hunting practices, as well as a better understanding of the exploitation of animals that occurred at the time.

Works Cited

Adams, Bradley J., and Pam J. Crabtree. Comparative Osteology: A Laboratory and Field Guide of Common North American Animals. Amsterdam: Academic Press, 2012.

Binford, Lewis R. "Butchering, Sharing, and the Archaeological Record." Journal of Anthropological Archaeology 3, no. 3 (1984): 235-57.

Beier, Paul, and Dale R. Mccullough. "Influence of Sex and Weather on White-tailed Deer Activity Patterns." Applied Animal Behaviour Science 29, no. 1-4 (1991): 507-08.

Blanton, Dennis B., and Julia A. King. Indian and European Contact in Context: The Mid-Atlantic Region. Gainesville: University Press of Florida, 2004.

Davis, Stephen. "Hillsboro Archaeological District." Published in Archaeology in America: An Encyclopedia, Volume I, Northeast and Southeast, edited by Francis P. McManamon, pp. 333-338, Greenwood Press, Westport, CT, 2009.

Davis, Stephen. Personal interview. 2016.

Driesch, Angela Von Den. A Guide to the Measurement of Animal Bones from Archaeological Sites: As Developed by the Institut Für Palaeoanatomie, Domestikationsforschung Und Geschichte Der Tiermedizin of the University of Munich. Cambridge, MA: Peabody Museum of Archaeology and Ethnology, Harvard University, 1976.

Driver, Jonathan C. "Identification, Classification and Zooarchaeology." Ethnobiology Letters EBL 2 (2011): 19.

Hillson, Simon. Teeth. Cambridge: Cambridge University Press, 1986.

Hillson, Simon. Mammal Bones and Teeth: An Introductory Guide to Methods of Identification. London: Institute of Archaeology, University College London, 1996.

Leberg, P. L., and M. H. Smith. "Influence of Density on Growth of White-Tailed Deer." Journal of Mammalogy 74, no. 3 (1993): 723-31.

Lyman, R. Lee. "Quantitative Units and Terminology in Zooarchaeology." American Antiquity 59, no. 1 (1994): 36.

Metcalfe, Duncan, and Kevin T. Jones. "A Reconsideration of Animal Body-Part Utility Indices." American Antiquity 53, no. 3 (1988): 486.

Munson, Patrick J. "Age-correlated Differential Destruction of Bones and Its Effect on Archaeological Mortality Profiles of Domestic Sheep and Goats." Journal of Archaeological Science 27, no. 5 (2000): 391-407.

Purdue, James R. "Epiphyseal Closure in White-Tailed Deer." The Journal of Wildlife Management 47, no. 4 (1983): 1207.

Purdue, James R. "Changes during the Holocene in the Size of White-tailed Deer (Odocoileus Virginianus) from Central Illinois." Quaternary Research 32, no. 3 (1989): 307-16.

Reitz, Elizabeth Jean, and Elizabeth S. Wing. Zooarchaeology. Cambridge: Cambridge University Press, 2007.

Schmid, Elisabeth. Atlas of Animal Bones. For Prehistorians, Archaeologists and Quaternary Geologists. Knochenatlas. Für Prähistoriker, Archäologen Und Quartärgeologen. Amsterdam: Elsevier Pub., 1972.

Severinghaus, C. W. "Tooth Development and Wear as Criteria of Age in White-Tailed Deer." The Journal of Wildlife Management 13, no. 2 (1949): 195.

Vanderwarker, Amber M., and Bill Stanyard. "Bearsfoot and Deer Legs: Archaeobotanical and Zooarchaeological Evidence of a Special-purpose Encampment at the Sandy Site, Roanoke, Virginia." Journal of Ethnobiology 29, no. 1 (2009): 129-48.

Ward, Trawick, and Stephen R.P. Davis. 2001. Tribes and Traders on the North Carolina Piedmont, A.D. 1000-1700. In Societies in Eclipse: Archaeology of the Eastern Woodland Indians, A.D. 1400-1700, edited by David S. Brose, C. Wesley Cowan, and Robert C. Mainfort, pp. 125-142. Washington, D.C.: Smithsonian Institution Press.